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ABSTRACT

A study was conducted to determine which of three major cue systems (linguistic, cognitive, or extralinguistic) 146 subjects at the kindergarten, first grade and second grade levels used to reconstruct meaning when confronted with a reading task. Cue system utilization was related to four factors: modality (listening versus reading), reading achievement as identified by classroom teachers, grade level, and familiarity with vocabulary. The subjects differed significantly in the utilization of various cue systems with an increasing utilization and dependency upon the linguistic system. (Author/FL)

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Cue System Utilization Among Beginning Readers

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Reading is the active process of reconstructing meaning from language represented by graphic symbols (Goodman, 1967). To this end there are five sources of cues which can be used to determine the meaning. These are (1) cue systems within words, (2) cue systems within the flow of language, (3) cue systems within the flow of connected discourse, (4) cue systems within the reader, and (5) extralinguistic cue systems external to both language and the reader (Smith, Goodman, and Meredith, 1970; Neuwirth, 1976; Meyer, 1976). The first three cue systems involve the grapho-phonemic, syntactic, and semantic systems within language. Cue systems within the reader involve the background of experience which the reader brings to the process and his extant conceptual abilities, scripts, and/or schemata (Pearson, 1976; Schank, 1972; Anderson, 1976). Whereas the first three systems suggest a linguistic based understanding of natural language processing, cue system #4 suggests the need for a conceptual based understanding of natural language processing. Cue system #5 consists of systems of supplied extraneous cues, i.e., pictures, charts, graphs, etc., which attempt to give substance to the descriptive language, and thus assist the reader to evoke the visual images of language and concepts so that understanding can occur.

Each of these cue systems is potentially effective in its ability to signal meaning (Smith, 1971). What distinctive features of what cue system is used by a reader to obtain meaning is an empirical question, but given the nature of the intellect and the nature of the reading task, it is likely to vary across individuals (Guilford, 1957; Bloom, 1963; Ausabel, 1963).

The purpose of this research is to determine which of the three major cue systems (linguistic, cognitive and extralinguistic) readers use in their efforts to reconstruct meaning when confronted with a reading task and to study cue system utilization patterns across children at beginning grade levels. For purposes of this research it is assumed that all three of the major cue systems are potentially equally effective in assisting the reader to reconstruct meaning. Differences, if they exist will reflect individual style based on intellectual potency, maturation or experience.

Research Design:

Population. The target group of this research was early readers. A total of 146 subjects were included. Fifty-six of the subjects were

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kindergartners, thirty were first graders, and sixty were second graders. The subjects were all pupils in one or the other of two elementary schools selected arbitrarily within a small community in southern Indiana. Teachers were asked to rank order the pupils in their room in terms of reading achievement based on whatever criteria they elected to use. Those pupils that teachers identified as being in the upper 25 percent of the class hereafter are referred to as Q_1 subjects. Those pupils that teachers identified as being in the lower 25 percent of the class are referred to as Q_4 subjects.

Materials. The book, Frog, Where Are You?, by Mercer Mayer (1969), was used as the reading stimulus. The original publication is a wordless book. The sequence of pictures, however, are such that a story may be easily generated around the activities and feelings of a boy, a dog, and a frog. A story was written and attached to the book so that each page contained linguistic cues from the presented words and extralinguistic cues from the pictures. The story was designed to generate a plot to give continuity to the series of pictures.

The book, then in its final form, contained a written and pictorial description of the feelings experienced by the characters within the context of a story. On all but six pages the pictorial and written story were congruent. However, on six selected pages the expressed feelings in the written passages were contrary to that expressed in the pictures. To give an example, the verbal description at one point said, "Bill and Duke are sad because they lost their friend" but the picture immediately adjoining the written statement showed the boy and dog with unmistakable grins on their faces.

Three of the expressed feelings in the written mode were common vocabulary items (sad, bad, mad); that is, these words have been found by others to be within the speaking vocabularies of kindergarten, first and second graders (Moe and Hopkins, 1975; Murphy et al., 1957). The verbal descriptions of the incongruent feelings expressed on the other three pages were supposedly uncommon vocabulary items (proud, lonesome and terrified). The relative status of these words was checked with a random sample of thirty-four subjects. All of the subjects easily defined the common words. Whereas 88 percent of the Q_1 subjects defined the uncommon words only 71 percent of the Q_4 subjects could do so. Definition criteria were liberal, for instance, happy was accepted as a synonym for proud.

To sum up, a set of materials was developed with multiple potential cue systems. First, a reader might obtain information from either explicit words or from accompanying pictures. These are known as linguistic or extralinguistic cues. Furthermore, selected linguistic cues differed in that some were common words in most early readers vocabulary while others were uncommon words supposedly seldom used by children of this age. The reader might also refer to a third source for cues as to the nature of the story. This third source being the cognitive structure

of the story which the individual may have developed himself as to what is happening. This third source may be independent of either the linguistic or extralinguistic cues found on a particular page.

Procedures. Only the Q_1 and Q_4 pupils as judged by the teacher were included as subjects in the study. The names were randomly distributed and each was individually called out of the classroom for trial. The examiner did not know the status of any of the subjects. The subject and the examiner were seated side by side and the book was placed in front of the respective subjects. With the exception of two classes of second graders who read the story for themselves (n-34), the examiner read the story to the respective subjects. When the examiner completed each of the six preselected pages on which the written story was incongruent with the pictorial story the examiner asked, "How does (name of specific character) feel?" The subject could respond with a statement reflecting the written content just read (taken as evidence of linguistic cue utilization), the feeling depicted in the picture (extralinguistic cue utilization), some unrepresented source within the subject's personal experience (cognitive cue utilization), or no response (not scoreable). The subject's response was recorded by a simple check mark in a chart on the desk. Subjects did not show any concern with this action and seemed to accept it as part of the task.

After completing the story each subject returned to the classroom and the next subject was invited outside for the story. All subjects seemed eager to participate and upon its completion indicated that they enjoyed the story. Class activities proceeded naturally so that pupils did not have an opportunity to communicate with one another about the experience or the content of the story.

Data Analysis:

The 876 responses, six responses for each of 146 subjects, were coded and analyzed as a reflection of the respective use of the three discrete cue systems designated as linguistic, extralinguistic and cognitive.

In keeping with the nature of the study the data analysis will be presented in two forms. First, the data will be presented as proportions and the differences in the use of specific cue systems will be illustrated graphicly with respect to grade levels, pupil status levels, familiarity of vocabulary and mode of presentation. The graphs may also be used to demonstrate the interactive effects of the variables.

Secondly, we will have a statistical analysis to compare the use of linguistic cues by the respective groups.

Graphic analysis: Table 1 offers a summary of the cue systems used by the subjects of the various groups for common and uncommon vocabulary words. Each of the graphs which follow are based upon the data from Table 1.

Graph 1 is a representation of the proportional use of the respective cue systems; linguistic, extralinguistic and cognitive. Kindergarten pupils tend to use extralinguistic cues in preference to either linguistic or cognitive cues. However, the trend is strongly biased toward a greater use of linguistic cues in the succeeding grade levels. The use of both extralinguistic and cognitive cues drop in frequency as the subjects move to grade levels with formal reading instruction. As noted in graphs 2 and 3 the effects are true for both high and low status pupils as well as with common and uncommon vocabularies.

It is also apparent from graph 2 that those subjects identified by their teachers as high status tend to consistently use linguistic cues to a greater degree than do those subjects of low status. Likewise, it appears from graph 3 that when the familiar common words are used in the text the subjects of all grade levels tend to utilize the linguistic cues.

Graphs 4, 5 and 6 illustrate the interaction of grade level, status and commonness of vocabulary with respect to the use of the respective cue systems. From graph 4 we see that the proportional use of linguistic cues is a rank order function of the interaction of status, familiarity of vocabulary and grade level. The shift to linguistic cues seem to be almost linear and parallel.

It would appear from graph 5 that while there is a decrease in the use of extralinguistic cues with grade level that the effect of familiarity of the vocabulary is a more powerful factor than is status. That is, after formal reading instruction began in the first grade the high status subjects virtually cease to use extra linguistic cues for common words. Though the effect seems delayed a year the low status subjects tended not to use extralinguistic cues in the second grade for common words. However, both groups of subjects were more prone to use the extralinguistic cues when confronted with the less familiar uncommon words.

It is interesting to note in graph 6 that the high status subjects tend to use the context of the story, cognitive cues, proportionally less frequently than do low status subjects. The graphs also suggest that both groups refer to the cognitive cues more frequently when the vocabulary is common than uncommon. No doubt, the differences are not statisticly significant so that which we observe may be a matter of sampling.

The differences between the high and low status subjects with respect to mode of presentation is also of interest. Whereas, twenty six of the second grade subjects were read to as were those in the kindergarten and first grade, thirty four second grade subjects read the story aloud. As readers, the high status subjects utilized linguistic cues more frequently than did those who were read to. See graph 4. In passing it may be noted that these subjects, unlike other second graders, did not offer multiple responses to be double coded. It was as if when reading they focused more on the explicitly presented words.

Drawing conclusions by eyeballing graphs is precarious. Therefore, we shall now move on to a statistical analysis of the data.

Statistical analysis. An analysis was completed for the linguistic cue system across grade levels and status levels for common and uncommon vocabularies. Sine there is an inverse relationship between the use of linguistic and the other two cueing systems it was decided that the critical conclusions could be found from an analysis of the linguistic data and extrapulated for the other cue systems as desired.

The scores were calculated by counting the frequency with which each subject selected the linguistic cue. Separate scores were identified for the common and uncommon vocabularies. Thus, the scores ranged from zero to three. Table 2 presents a summary of the data.

The data is presented in Table 3 for the linguistic cues, common vocabulary in a four by two design for analysis of variance. The respective groups are grade level by status. Likewise, Table 4 contains the data for uncommon vocabulary. The F values are significant beyond the .001 level of confidence which indicates that significant differences between the groups do exist.

A t test was calculated to compare the respective group interactions for common and uncommon vocabulary levels. Table 5 presents a summary of the data with pooled variance.

The statistical comparisons show that with respect to common vocabulary terms the first and second graders differ at the 5 per cent level of confidence. The difference between the kindergarten and first grade subjects differed considerably but not significantly. The difference between the high status and low status subjects was at the .001 level.

With uncommon vocabulary terms the kindergarten and first grade subjects as well as the high and low status subjects differed at the .001 level of confidence.

The respective groups were also compared with respect to their use of the linguistic cues for common and uncommon words. Significant differences were found for kindergarten and second grade subjects. The differences across all grade levels exist for both the high and low status groups.

Summary. From the graphs one obtains the following impressions:

The proportional use of linguistic cues increases dramatically with grade level. (See graph 1)

The proportional use of extralinguistic cues decreases with grade level. (See graph 1)

At the kindergarten level low status subjects show strong preference for extralinguistic cues for uncommon vocabulary. (See graph 1)

High status subjects utilize linguistic cues at all grade levels to a greater extent than do low status subjects. (See graph 2)

The proportional use of linguistic cues is greater for common vocabulary than uncommon vocabulary at all grade levels. (See graph 3)

The proportional use of linguistic cues is a rank order function of the interaction of reading achievement level, commonness of vocabulary and grade level. (See graph 4)

Low status subjects show a steady increase in the use of linguistic cues by grade level for both common and uncommon vocabulary. (See graph 4)

The mode of presentation has no differential effect in the proportional use of cue systems for low status subjects regardless of vocabulary level. However, high status subjects tend to utilize more linguistic cues when they, themselves read. (See graph 4)

The use of extralinguistic cues drops dramatically with formal reading instruction, particularly with high status subjects. (See graph 5)

The proportional use of cognitive cues declines with grade level. (See graph 6)

The more rigorous statistical analysis shows the high status youngsters utilize the linguistic cues to a more significant degree than do low status subjects. There is a significant shift from extralinguistic cues to linguistic cues between kindergarten and first grade for the uncommon words though this was not apparent for the common words. In the case of common words the shift from extralinguistic to linguistic took place between first and second grade.

Interpretation:

The results of this study shed some light on one question and add fuel to a second.

The study offers evidence for optimism in terms of the potential of all children with respect to reading. If one considers the task of reading to be semantics, obtaining meaning, then it is evident that all of the tested youngsters in this study have the potential. Of the 876 responses pertaining to the story only eight were uncodable. (Seven of these were of the no answer type and one was nonsense from the examiners perception.) This is particularly remarkable when one considers that one half of the subjects were considered by their teachers to be in the lowest quartile of their classes. It must be noted of course that the responses were accepted if they reflected cognizance of the story from the context, the accompanying pictures, or the explicit words. This suggests that though the potential exists, it varies among the individuals in mode. It would appear that in both teaching and judging learners we must be tolerant of variants.

It would seem desirable to encourage pupils to seek cues for comprehension from all possible sources. That is, it would seem unfortunate, not only because of the diversity of individual potential, but for optimum reading achievement if the pupils were to focus most of their attention on words. Therefore, the following question is salient. Are the shifts from the cognitive and extralinguistic cues to the linguistic a function of maturation or instruction?

It is not the purpose of this paper to delve into this issue. However, there would not seem to be any particular reason to expect that development alone should cause such a shift. If teachers focus on the importance of individual words during reading instruction then instruction could be the explanation. It may be more than coincidental that the high status subjects, as determined by the teachers, were more prone to use linguistic cues.

Table 1

Proportions of Responses Reflecting the Use of Various Cue Systems by Grade Level, Mode of Presentation, Status Level and Vocabulary Level

Cues for Responses by Vocabulary Level	Status Level by Grade Level and Mode of Presentation											
	Kdg. n= 56 Read to			First n= 30 Read to			Second n= 60					
							Read to			Readers		
	Q_1	Q_4	T	Q_1	Q_4	T	Q_1	Q_4	T	Q_1	Q_4	T
Linguistic Cues												
Common Vocab.	.55	.36	.47	.81	.44	.63	.82	.72	.78	.92	.67	.82
Uncommon Vocab.	.20	.05	.14	.50	.20	.36	.62	.41	.51	.81	.41	.65
Total	.37	.20	.31	.65	.32	.50	.72	.57	.65	.87	.55	.73
Extralinguistic Cues												
Common Vocab.	.24	.30	.27	.02	.33	.17	.08	.10	.09	.00	.10	.05
Uncommon Vocab.	.58	.67	.67	.46	.64	.55	.36	.46	.41	.14	.48	.28
Total	.46	.49	.47	.24	.48	.36	.22	.28	.25	.07	.28	.16
Cognitive Cues												
Common Vocab.	.22	.30	.26	.17	.20	.18	.15	.18	.17	.08	.24	.16
Uncommon Vocab.	.12	.27	.18	.10	.13	.12	.18	.13	.15	.05	.19	.12
Total	.17	.28	.22	.13	.17	.15	.16	.16	.16	.06	.22	.14

Note: The sum of proportions for a given subgroup within a given level of vocabulary ought to add up to 1.00, e.g., for kdg., Q_1, Common Vocabulary .55 + .24 + .22 ought to equal 1.00. However, the proportions may not add up to exactly 1.00 for two reasons. First, there were eight ommissions plus one uncodeable response. On the other hand some responses were double coded. In a few instances among the high status group subjects would say something like: "Well, if you look at the pictures he is happy but the book said that he is sad."

Table 2

Means and Standard Deviations in the Use of Linguistic Cues

by Status, Grade Level and Mode of Presentation

for Common and Uncommon Vocabularies

Vocabulary	Status, Grade Level and Mode of Presentation							
	Kindergarten		First		Second		Second Readers	
	Q_1	Q_4	Q_1	Q_4	Q_1	Q_4	Q_1	Q_4
Common								
n	34	22	15	15	13	13	23	11
Mean	1.56	1.00	2.53	.93	2.39	2.31	2.57	1.64
S.D.	1.08	1.07	.74	.96	.96	1.30	.79	1.03
Uncommon								
n	34	22	15	15	13	13	23	11
Mean	.64	.18	2.07	.53	1.69	1.31	2.30	1.09
S.D.	.71	.40	1.03	.83	1.34	1.03	.88	.94

Table 3

Two Way Analysis of Variance by Status, Grade Level and Mode of Presentation for Common Vocabulary in the Use of Linguistic Cues

Source of Variation	df	MS	F Value
Grade Level	3	8.248	8.68**
Status	1	20.17	21.24**
Grade X Status	3	3.02	3.18*
Within Groups	138	.950	

Table 4

Two Way Analysis of Variance by Status, Grade Level and Mode of Presentation for Uncommon Vocabulary

Source of Variation	df	MS	F Value
Grade Level	3	13.69	17.32**
Status	1	26.06	32.98**
Grade X Status	3	2.62	3.32*
Within Groups	138	.790	

* $p < .05$

** $p < .001$

Table 5

A Comparison of the Use of Linguistic Cues

for Common and Uncommon Vocabularies

Vocabulary	Grade Level and Mode of Presentation				Status	
	Kdg.	First	Second	Second Readers	Q_1	Q_4
Common						
n	56	30	26	34	85	61
Mean	1.34	1.73	2.35	2.26	2.13	1.38
S.D.	1.1	1.17	.98	.96	1.03	1.14
t Value	1.55	2.10*	.32		4.15**	
df	84	54	58		144	
Uncommon						
n	56	30	26	34	85	61
Mean	.46	1.30	1.50	1.91	1.51	.67
S.D.	.69	1.21	1.21	1.05	1.19	.89
t Value	4.10**	.62	1.41		4.62**	
df	84	54	58		144	
t Value	3.62*	1.01	2.18*	1.02	2.58*	4.34**

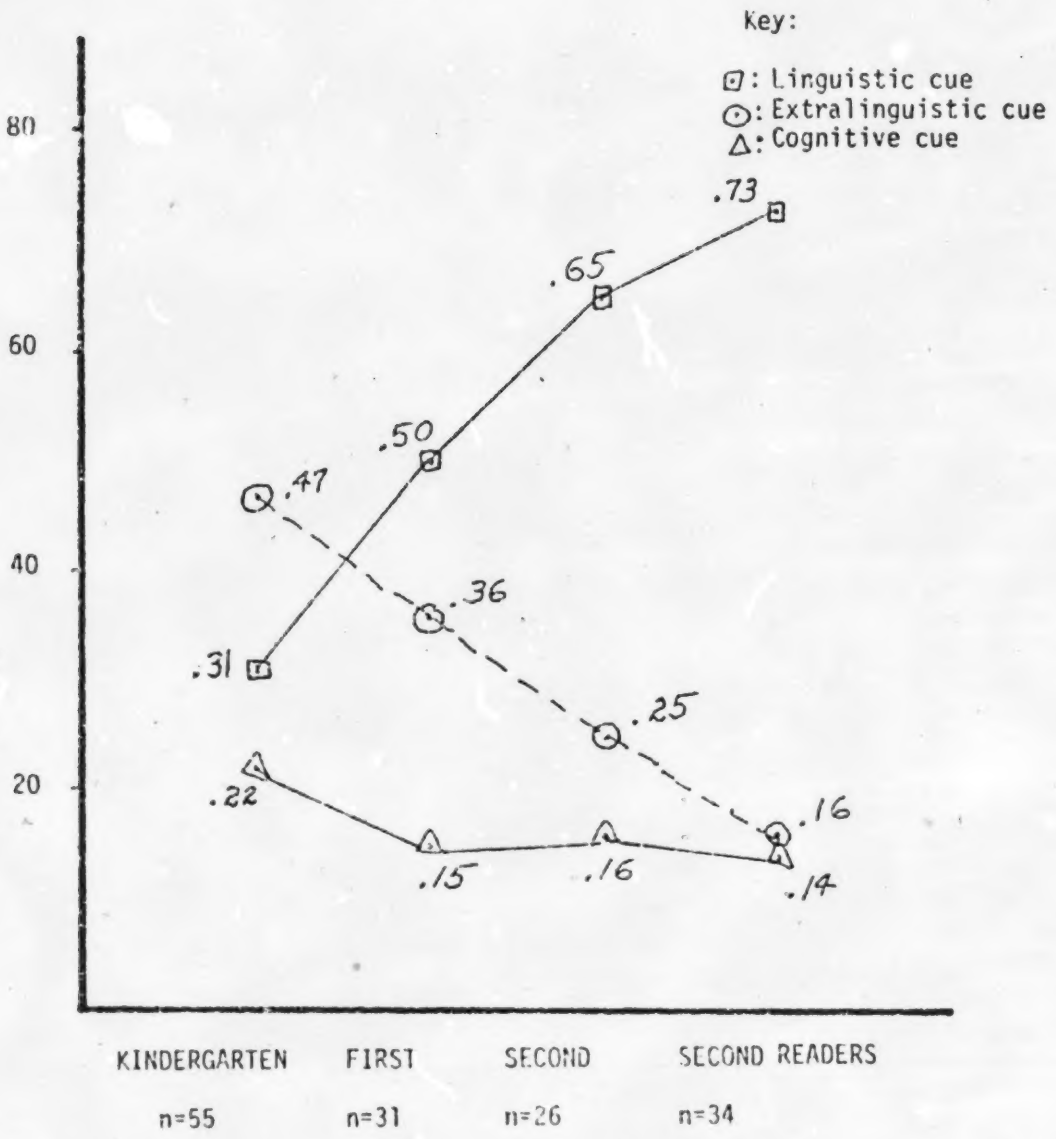
A Comparisonwith-
in each group
with respect to
vocabulary levels

GRAPH 1

PROPORTION OF RESPONSES REFLECTING

DIFFERENT CUE SOURCES

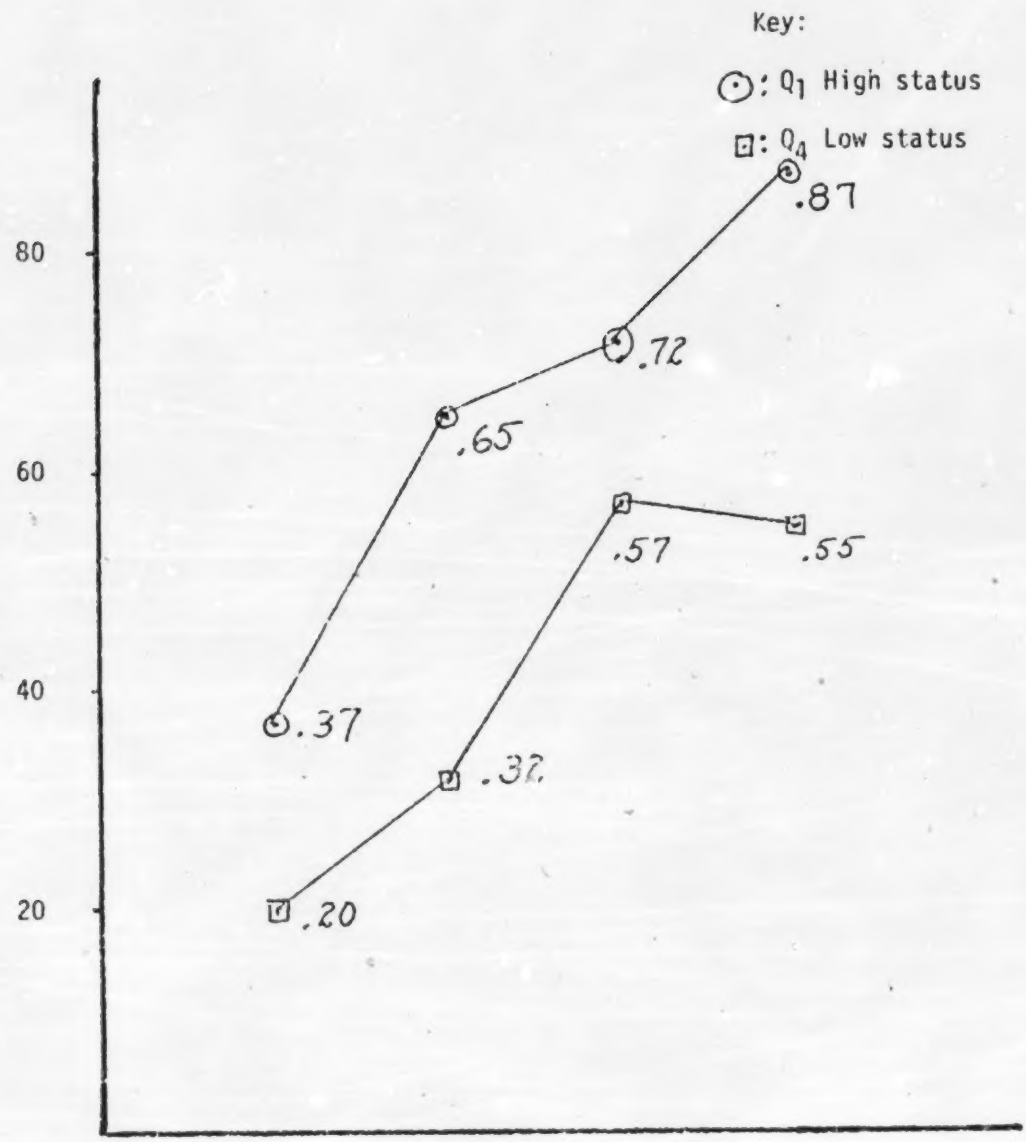
AT EACH GRADE LEVEL



GRAPH 2

PROPORTION OF RESPONSES REFLECTING THE USE OF LINGUISTIC CUES

BY HIGH AND LOW STATUS SUBJECTS AT EACH GRADE LEVEL



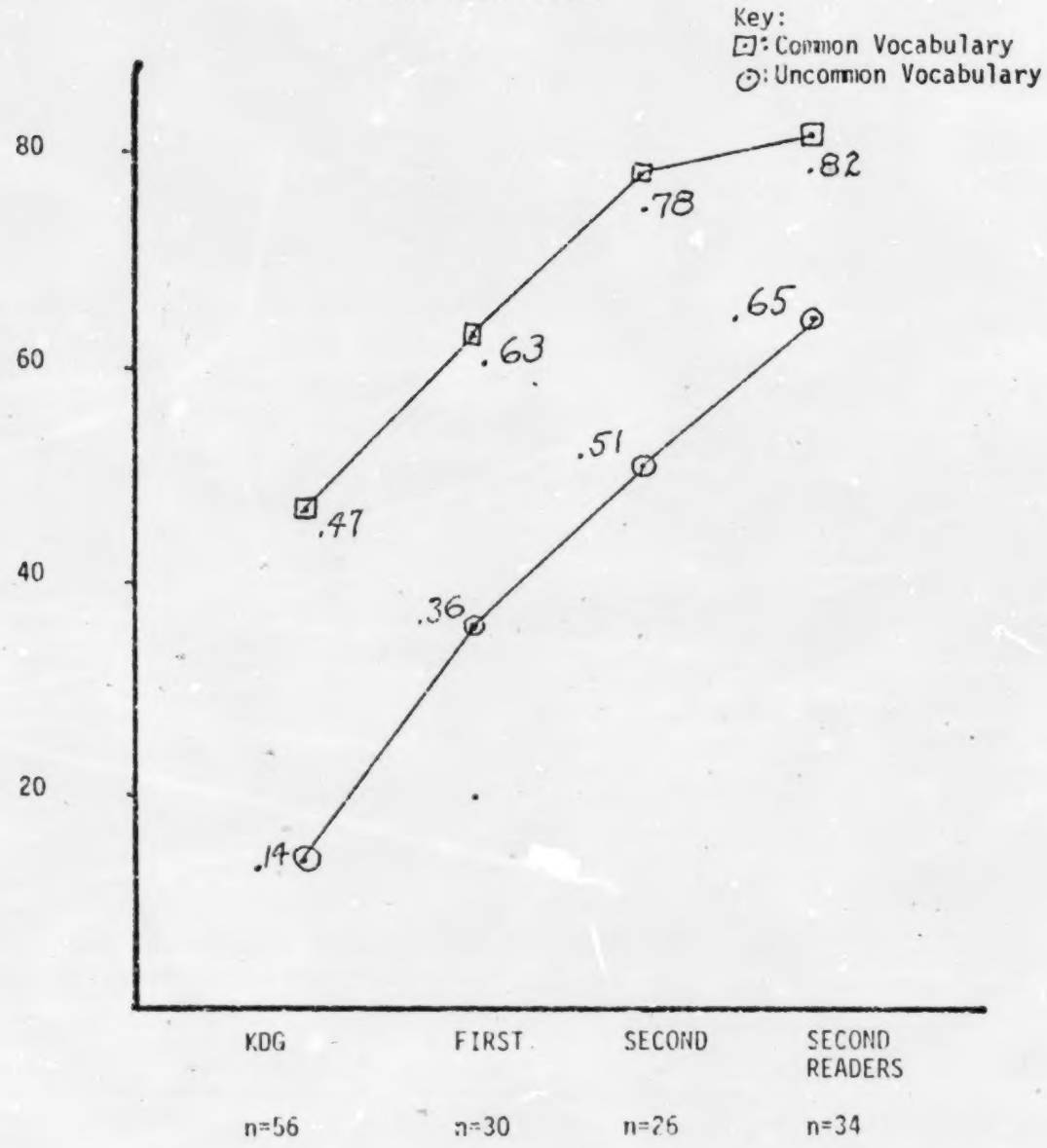
KINDERGARTEN	FIRST	SECOND	SECOND READERS
n=56	n=30	n=26	n=34
Q_1=34	Q_1=15	Q_1=13	Q_1=23
Q_4=22	Q_4=15	Q_4=13	Q_4=11

GRAPH 3

PROPORTION OF RESPONSES REFLECTING THE USE OF LINGUISTIC CUES

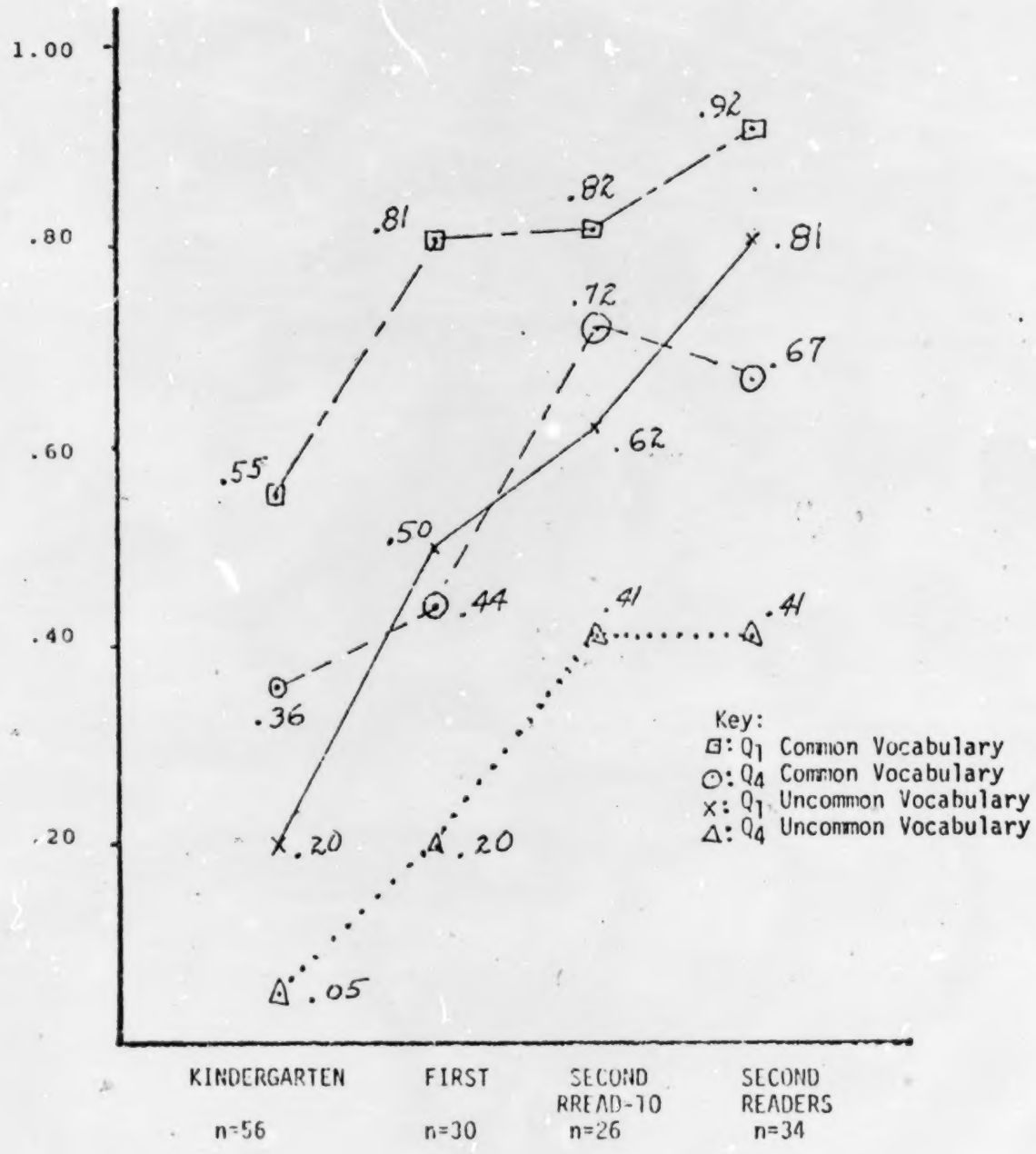
FOR DIFFERENT VOCABULARY LEVELS

AT EACH GRADE LEVEL



GRAPH 4

PROPORTION OF RESPONSES REFLECTING THE USE OF LINGUISTIC CUES FOR DIFFERENT VOCABULARY LEVELS BY HIGH AND LOW STATUS SUBJECTS BY EACH GRADE LEVEL

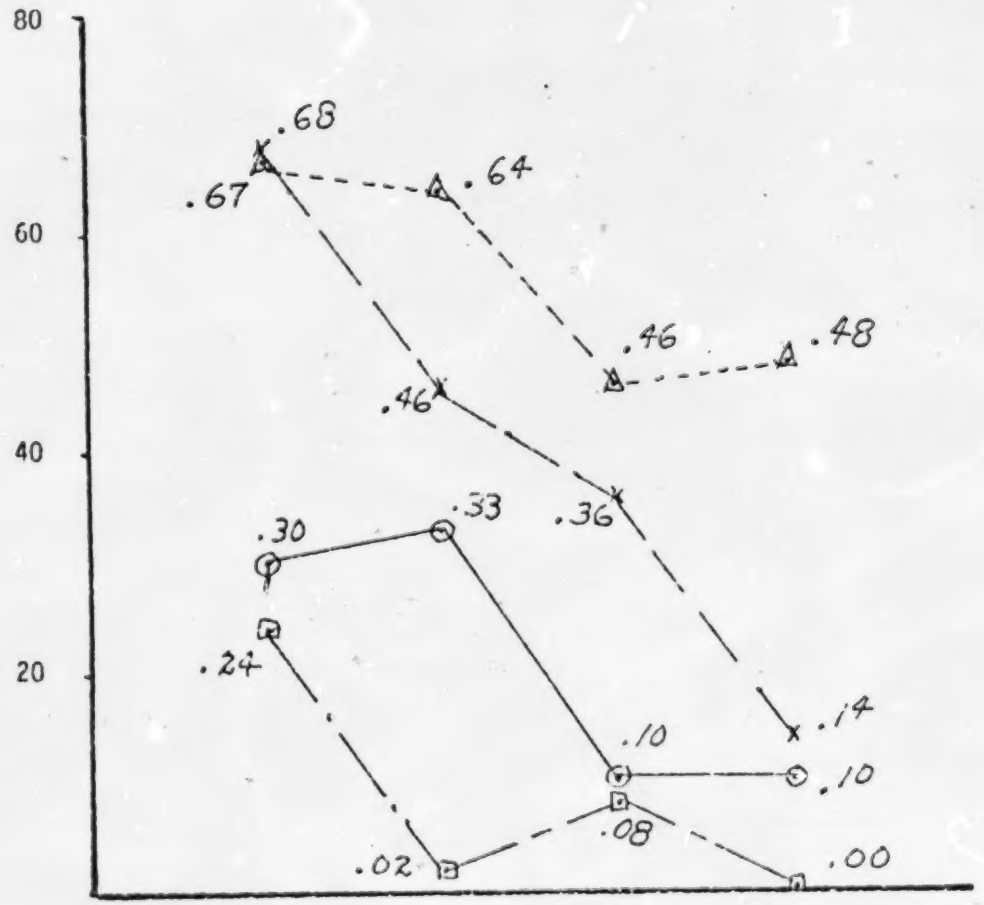


GRAPH 5

PROPORTION OF RESPONSES REFLECTING THE USE OF EXTRALINGUISTIC CUES FOR DIFFERENT VOCABULARY LEVELS BY HIGH AND LOW STATUS SUBJECTS AT EACH GRADE LEVEL

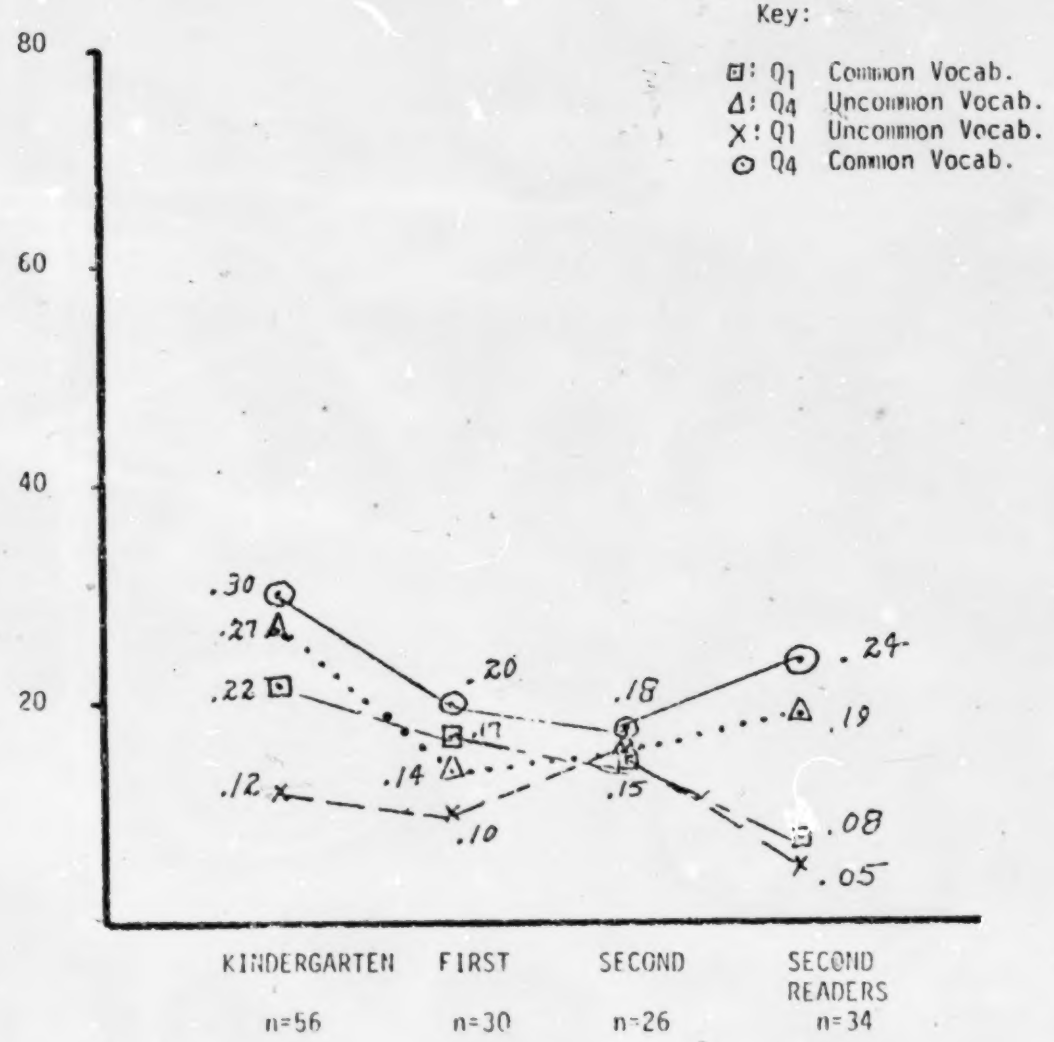
Key:

- ⊡: Q_1 Common Vocabulary
- ⊙: Q_4 Common Vocabulary
- X: Q_1 Uncommon Vocabulary
- △: Q_4 Uncommon Vocabulary



GRAPH 6

PROPORTION OF RESPONSES REFLECTING THE USE OF COGNITIVE CUES FOR DIFFERENT VOCABULARY LEVELS BY HIGH AND LOW STATUS SUBJECTS AT EACH GRADE LEVEL



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